Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Efron in view of Smith (US 5,945,932).

Applicants respectfully traverse these rejections in view of the following comments.

Discussion of Efron

Efron does not disclose or remotely suggest the concept of forming a <u>steganographic signal</u> as claimed by Applicant. Steganography is defined as: "Hiding a secret message within a larger one in such a way that others cannot discern the presence or contents of the hidden message (See attached printout from dictionary.com). Therefore, a steganographic signal is <u>one in which a message is hidden in such a way that its presence and/or content cannot be discerned</u> (See e.g., Applicants' specification, page 11, lines 15-26). Efron does not disclose or remotely suggest the formation of a steganographic signal as claimed by Applicants.

Further, there is no disclosure or suggestion of <u>watermarking</u> in Efron. In Applicants' claims, a watermark is added to the host signal so that a steganographic signal is formed as discussed above. The Examiner has equated the "signature" of Efron with Applicants' claimed watermark. The term "watermark" is well known in the art and is defined as a substantially imperceptible signal which is <u>added to</u> a host signal (see, e.g., attached definition from webopedia.com and Applicants' specification, page 11, lines 15-25). Therefore, the watermark claimed by Applicants is <u>additional information</u> (i.e., an auxiliary signal) which is

added to the host signal by embedding it in the host signal.

As acknowledged by the Examiner on page 2 of the Office Action, Efron discloses that the signature is comprised of a multiplicity of test parameters (Efron, Col. 8, lines 10-11). These parameters (i.e., the signature) may be produced, for example, by performing a large number of audio and video measurements on the unit under test (Efron, Col. 8, line 23-25). Thus according to Efron, this signature is not additional information which is embedded (i.e., added imperceptibly) to the host signal. The parameters that make up Efron's signature are inherently present in the signal and do not comprise additional information which is equivalent to an embedded watermark as claimed by Applicants. As discussed above, in contrast to the known signal parameters which make up Efron's signature, a watermark, according to its definition and shown in Figures 1-8 of present invention, is a set of additional (auxiliary) data that are added to a host signal (se, e.g., Applicants' Fig. 2, element). This added data is imperceptibly embedded into the host signal to form a steganographic signal. Applicants' host signal, plus the added watermark, may or may not be stored on a medium.

Further, the parameters which make up the signature of Efron are measured from the content without altering the content or signal carrying the content. The measured parameters are stored in signature store 168 for use as a reference signature and also stored in signature store 231 for use as the output signature of the device under test (Col. 39, lines 33-48; Figures 25-27). This process cannot

be equated to the watermarking claimed by Applicants,
wherein additional information is embedded in the signal,
thereby altering it in a substantially imperceptible
manner.

In addition, the signature in Efron is derived by
analyzing the test signal and program material (Col. 9,
lines 58-59). For example, to derive the signature of
Efron, audio spectrums may be obtained at intervals
throughout the active program area and data so obtained
becomes part of the signature (Col. 10, lines 28-30).
Therefore, the signature of Efron is content dependent and
different content will necessarily have different
signatures. In contrast, watermark data is not derived from
the signal in which it is embedded. A watermark comprises
additional data which is embedded into the signal, and each
content signal can therefore carry the same watermark.

With Applicants' claim 1, the deterioration of the
embedded watermark is measured. In Efron, degradation of a
signature (i.e., a multiplicity of test parameters
collected during the recording/playback of the signal) is
evaluated. In Efron, there is no embedded watermark and
therefore, its deterioration can not be measured.

Further, the Examiner, on page 2, last paragraph of
the Office Action, indicates that "This signature is stated
as being stored on a video or audio medium (see Efron Col.
7, lines 26-37) and can also be used for the purposes of
copy protection since ....". This statement is not
accurate since the cited portions indicate that the
signature is derived from the measurements of magnetic tape
masters. In addition, the examiner, once again, is

confusing a watermark (i.e., an auxiliary signal <u>embedded</u> within a host signal) and Efron's signature (i.e., parameters inherent in the signal and derived from measurements of the stored signal). For the signature in Efron to be used in a copy protection system, the end user would need to have the particular reference signature corresponding to each content whose distortion is to be evaluated. In contrast, using Applicants' watermarking system for copy control applications requires use of only the extracted watermark.

Additionally, in the last paragraph of Item 2, on page 3 of the Office Action, the Examiner indicates that "... (the signature) provides redundancy to the signal because it does not change or affect the quality of the disc it is stored upon." Applicants respectfully submit that the signature of Efron (i.e., a set of parameters inherent to the signal) does not provide <u>redundancy</u> simply due to the fact that the parameters do not change the quality of storage disc. Examples of embedding a watermark with a degree of redundancy as claimed in the present invention include embedding the watermark (or portions of it) <u>multiple times</u> within the content, adding error correction codes, etc. (See, e.g., Applicants' specification, page 14, lines 10-28).

In the last sentence of page 3 of the Office Action, the Examiner indicates that the signature of Efron is "embedded within a signal stored within the audio or video medium". It should be pointed out again that there is a distinct difference between a watermark that is embedded within a host signal (as an additive signal) to form a

steganographic signal and the signature of Efron which is
defined by existing parameters which are inherently present
in the signal.

On Page 4, second paragraph of the Office Action, the
Examiner indicates that "Efron discloses the measurement
and evaluation of the signal stored/embedded within the
storage medium". It should be pointed out that embedding a
watermark into a signal to produce a steganographic signal
as claimed by Applicants is significantly different from
storing a signal within a storage medium as is the case in
Efron.

Further, with Applicants' claimed invention, it is the
deterioration of the embedded watermark which enables the
determination of the nature and/or extent of processing.
With Applicants' claimed invention, there is no need to
compare original input parameters of the signal with
measured output parameters as in Efron. In contrast with
Efron, due to the redundancy of the embedded watermark
claimed by Applicant, the estimation of the nature and/or
amount of processing can be accomplished blindly (i.e.,
without knowledge of the input content). The degree of
redundancy of the embedded watermark enables recovery of
the watermark from the processed signal. For example, the
watermark information (e.g., represented by a plurality of
data bits) may be repeated hundreds of times. Even if a
high percentage of these data bits may be destroyed through
processing of the signal, it is still possible to reliably
recover data bits making up the watermark from the
processed signal, due to the high degree of redundancy of
the data bits in the original signal. Once the data bits of

the original watermark are recovered, the estimation of the processing can be made based on the percentage of incorrect bits in the raw data stream comprising the watermark and deriving a bit-error-rate measurement (BER) therefrom (see, e.g., Applicants' specification, page 14, lines 10-23). This information can be used to estimate the nature and/or amount of processing of the signal.

Finally, Efron does not disclose or remotely suggest anything about <u>analyzing the intrinsic fragility of a signal which is a carrier of a watermark layer</u>, as set forth in Applicants' claims 13 and 23. As Efron does not disclose or remotely suggest the concept of watermarking as discussed above, it cannot be read as disclosing the features of Applicants' claims 13 and 23. The Examiner's reliance on the cited portions of Efron are misplaced. Nowhere in the cited portions are the words "fragility", "watermark", or "fragility profile" used. In fact, a computerized keyword search of Efron indicates that these terms do not appear <u>at all</u> in the disclosure of Efron.

For example in Applicants' claims 13 and 23, a fragility profile is determined, which is defined as <u>a model or function that relates a degradation measure of the watermark layer to a degradation measure of the signal that carries the watermark</u>. In contrast, Efron only compares <u>known parameters</u> of a signal against measured output parameters <u>of the same signal</u> to determine degradation of the signal itself.

In sum, the Examiner's rejections of Applicants' claims are based on an erroneous assumption that the claimed watermark is equivalent to the signal disclosed in

Efron. As discussed above in detail, the disclosure of
Efron is not even remotely concerned with the concepts of
watermarking or the formation of a steganographic signal.
Therefore, Efron does not disclose or suggest the following
features of Applicants' independent claims 1 and 22:

- Embedding a watermark into a signal;

- Embedding the watermark into the signal with a
degree of redundancy;

- Embedding the watermark into the signal to form a
steganographic signal;

- Measuring deterioration of the embedded watermark
in the steganographic signal after the steganographic
signal undergoes processing; and

- Estimating the nature and/or amount of processing
based on the measured deterioration of the watermark.

Further, Efron does not disclose or remotely suggest
the following features of Applicants' independent claims 13
and 23:

- Analyzing an intrinsic fragility of a signal
which is a carrier of a watermark layer;

- Determining a fragility profile based on the
analysis; and

- Wherein the fragility profile is a model or
function that relates a degradation measure of the
watermark layer to a degradation measure of the signal
that carries the watermark.

Applicants respectfully submit that the present
invention would not have been obvious in view of Efron,
taken alone or in combination with Shimpuku or Smith, or
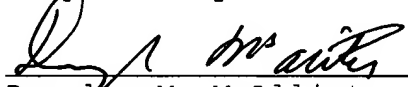any of the other prior art of record.

Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,

Douglas M. McAllister
Attorney for Applicant(s)
Registration No.: 37,886
Law Office of Barry R. Lipsitz
755 Main Street
Monroe, CT 06468
(203) 459-0200

ATTORNEY DOCKET NO.: SOL-148
Date: July 2, 2004